SPECIFICATION

Device Name : IGBT-IPM

Type Name : 6MBP50NA060-01

Spec. No. : MS6M0275

Fuji Electric Co.,Ltd.
Matsumoto Factory

	DATE	NAME	APPROVED
DRAWN	Mar.'27.'96	H.Kawakami	T.HOSEN
CHECKED	"	N.Terasawa	

Fuji Electric Co.,Ltd.

DWG.NO. MS6M0275 1/15

Revised Records

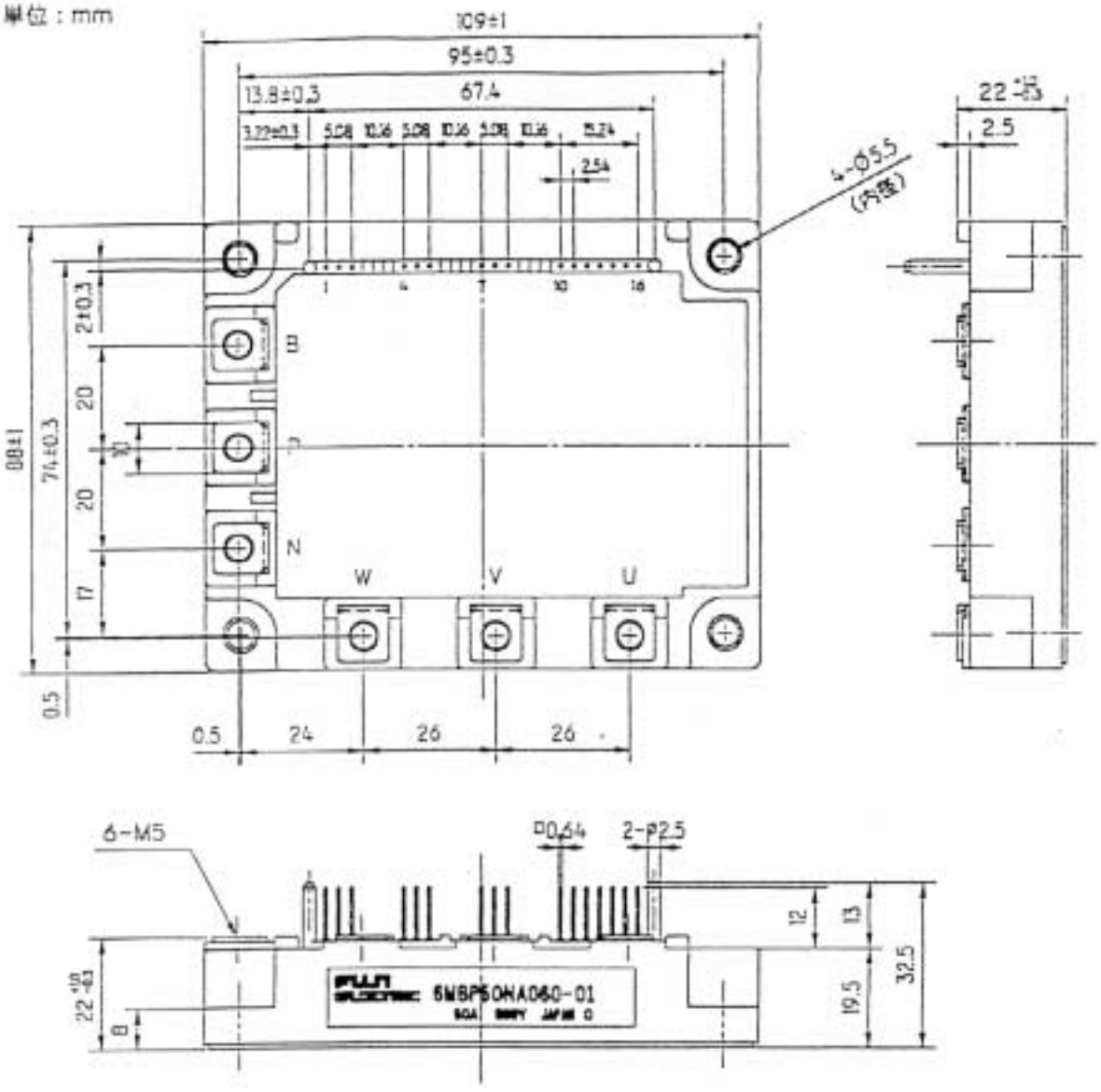
Date	Classi-fication	Ind.	Content	Applied date	Drawn	Checked	Approved
Mar.-27-'96	enactment	—	————	Issued date	———	N. Jerasaka	T. Hosen

1. Outline Drwing

外形図

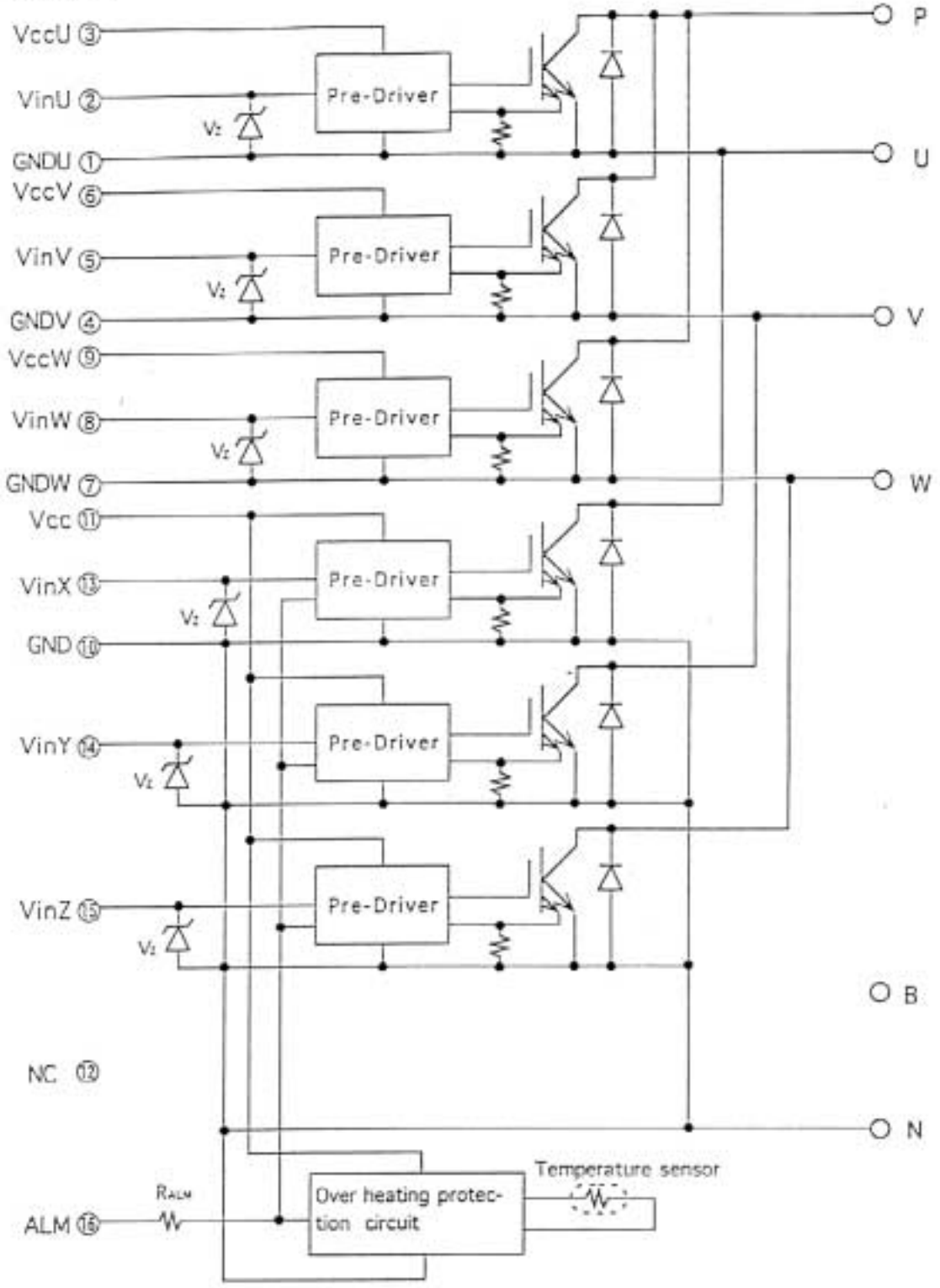
Unit : mm

単位 : mm



2. Block Diagram

ブロック図



Pre-Drivers include following functions

① Short Circuit Protection Circuit
② Amplifier for Driver
③ Under Voltage Lockout Circuit
④ Over current Protection Circuit

3. Absolute Maximum Ratings (at Tc=25℃ unless otherwise specified)

Items			Symbols	Ratings		Units
				Min.	Max.	
DC Bus Voltage			V_{DC}	0	450	V
DC Bus Voltage (surge)			$V_{DC(SURGE)}$	0	500	V
DC Bus Voltage (short operating)			V_{SC}	200	400	V
Collector-Emitter Voltage			V_{CES}	0	600	V
INV	Collector Current	DC	Ic	—	50	A
		1mS	Icp	—	100	A
		Duty=62.6%	-Ic	—	50	A
	Collector Power Dissipation	One Transistor	Pc	—	198	W
Junction Temperature			Tj	—	150	℃
Input Voltage of Power Supply for Pre-Driver			Vcc ※1	0	20	V
Input Signal Voltage			Vin ※2	0	Vz	V
Input Signal Current			Iin	—	1	mA
Alarm Signal Voltage			V_{ALM} ※3	0	Vcc	V
Alarm Signal Current			I_{ALM} ※4	—	15	mA
Storage Temperature			Tstg	-40	125	℃
Operating Case Temperature (Fig.1)			Top	-20	100	℃
Isolation Voltage (Case-Terminal)			Viso ※5	—	AC2.5	kV

Note ※1 Vcc shall be applied to the input Voltage between terminal No. 3 and 1, 6 and 4, 9 and 7, 11 and 10.
※2 Vin shall be applied to the input Voltage between terminal No. 2 and 1, 5 and 4, 8 and 7, 12 13 14 15 and 10.
※3 V_{ALM} shall be applied to the Voltage between terminal No. 16 and 10.
※4 I_{ALM} shall be applied to the input current to terminal No. 16.
※5 50Hz/60Hz sine wave 1 minute.

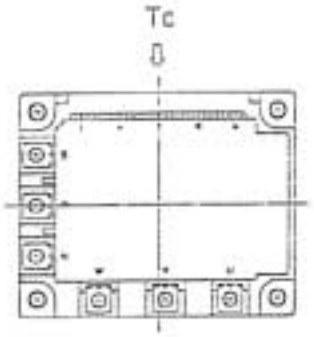


Fig.1 Measurement of case temperature

4. Electrical Characteristics

4.1 Electrical Characteristics of Power Circuit (at Tc=Tj=25℃,Vcc=15V)

	Items	Symbols	Conditions	Min.	Typ.	Max.	Units
I	Collector Current at off Signal Input	I_{CES}	VCE=600V	—	—	1.0	mA
N V	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	Ic=50A	—	—	2.9	V
	Forward Voltage of FWD	V_F	-Ic=50A	—	—	3.0	V

4.2 Electrical Characteristics of Control Circuit (at Tc=TJ=25℃,Vcc=15V)

Items	Symbols	Conditions	Min.	Typ.	Max.	Units
Power Supply Current of P-Line Side Pre-Driver (One Unit)	I_{CCP}	fsw=15kHz ※6 Duty=50%	—	6	16	mA
Power Supply Current of N-Line Side Three Pre-Drivers and Protection Circuits	I_{CCN}	fsw=15kHz Duty=50%	—	18	48	mA
Input signal Threshold Voltage	$V_{in(ON)}$	ON	1.00	1.35	1.70	V
	$V_{in(OFF)}$	OFF	1.25	1.60	1.95	
Zener Voltage	V_Z		6.9	—	7.7	V
Over Heating Protection(OH) Level	T_{OH}	VDC=0V,Ic=0A Case Temperature	100	—	125	℃
OH Hysterisis	T_H		—	20	—	℃
Over Current Protection(OC) Level INV	I_{OC}	Tj=125℃ Collector Current	65	—	—	A
OC Delay Time (Fig.2)	t_{DOC}	Tj=25℃	—	8	—	μS
Under Voltage Protection(UV) Level	V_{UVT}		11.0	12.0	12.5	V
UV Hysterisis	V_H		0.2	—	—	V
Alarm Signal Hold Time	t_{ALM}		0.8	2	—	mS
Delay Time of Short Circuit Protection (Fig.3)	tSC		12	—	—	μS
Limiting Resistor for Alarm	R_{ALM}		1425	1500	1575	Ω

※6 Switching frequency of IPM

4.3 Dynamic Characteristics (at Tc=Tj=125℃,Vcc=15V)

Items	Symbols	Conditions	Min.	Typ.	Max.	Units
Switching Time	ton	Ic=50A	0.3	—	—	μS
Fig.4	toff	Vbc=300V	—	—	3.6	μS
Switching Time (FWD)	trr	IF=50A,Voc=300V	—	—	400	nS

5. Thermal Characteristics (Tc=25℃)

Items			Symbols	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	INV	IGBT	Rth(j-c)	—	—	0.63	℃/W
		FWD	Rth(j-c)	—	—	1.33	℃/W
Case to Fin Thermal Resistance with Compound			Rth(c-f)	—	0.05	—	℃/W

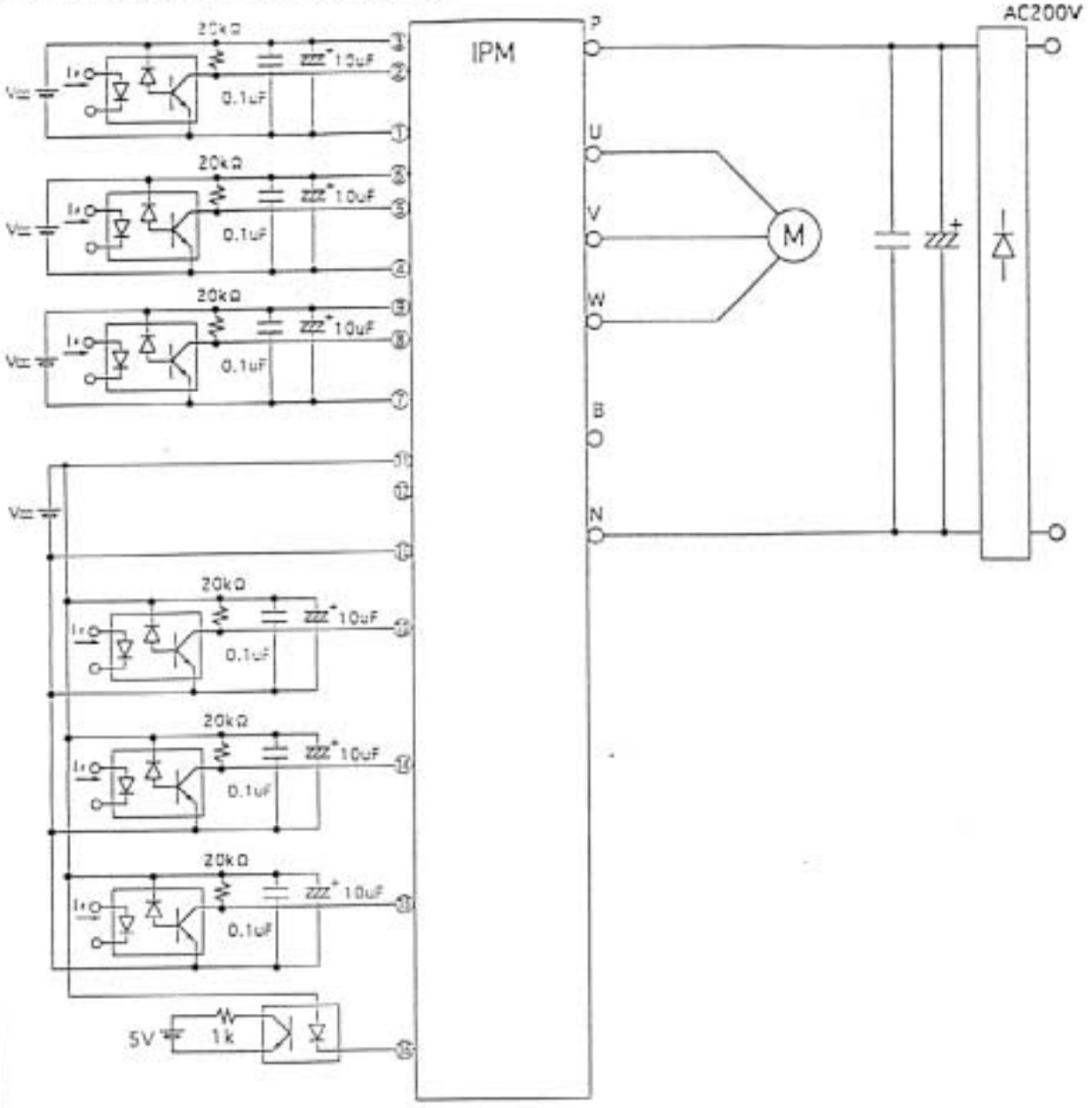
6.Mechanical Characteristics

Items		Min.	Typ.	Max.	Units
Screw Torque	Mounting (M5)	—	—	3.5	N·m
	Terminal (M5)	—	—	3.5	N·m
Weight		—	550	—	g

7.Recommendable Value

Items		Symbols	Conditions	Min.	Typ.	Max.	Units
DC Bus Voltage		Vdc		200	—	400	V
Operating Power Supply Voltage Range of Pre-Driver		Vcc		13.5	15	16.5	V
Switching frequency of IPM		f_{sw}		1	—	20	kHz
Screw Torque	Mounting (M5)	—		2.5	—	3.5	N·m
	Terminal (M5)	—		2.5	—	3.5	N·m

12.Example of applied circuit（応用回路例）



- The wiring between opto-coupler and input terminal of IPM should be shorter as much as possible. The stray-capacitance between primary and secondary side of opto-coupler should not be increased by pattern lay-out.
  ホトカプラとIPMの入力端子間配線は、できるだけ短くしホトカプラの１次・２次間の浮遊容量を増加させないパターンレイアウトとして下さい。
- Capacitor should be installed to VCC-GND terminal of high-speed opto- coupler closely as much as possible.
  高速ホトカプラのVcc-GND間には、コンデンサをできるだけ近接して取り付けて下さい。
- Use high-speed opto-coupler : tPLH,tPHL ≦ 0.8us, high CMR type. (Example : HCPL-4504)
  高速ホトカプラ：tPLH,tPHL ≦ 0.8 μs，高CMRタイプをご使用下さい。(例HPCL-4504)
- Low-speed opto-coupler : CTR ≧ 100%
  低速ホトカプラ：CTR ≧ 100%